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ABSTRACT

Information on resource allocation in United Kingdom (UK) universities, which is derived from a study by a Working Party of the Conference of University administrators, is presented. Attention is directed to: structures and constitutions; the use of norms and formulas; administration and central services; minor works, maintenance, and space; and equipment. Norms and formulas included: student load formulas and weightings for level of study, academic staffing levels and staff/student ratios, and technical support staff ratios. It is hypothesized that expenditure on academic and related departmental staff will tend to cluster around the average more closely than will other expenditures. If it is assumed that every university has its norm provision of space for its exact mixture of students (by discipline and level of study), area-related costs can be calculated per square meter and compared with the British average. Data are provided on the following: percentage relationships between the University of Bath and Great Britain total net unit costs with different weightings for level of study, 1979-80; the range of undergraduate total net departmental unit costs (Great Britain averages), 1979-80; the relationship of expenditure on departmental academic and related staff in Bath (1979-80) to what it would have been if expenditure was at the Great Britain level on average. A computer tabulation of expenditures at the University of Bath and its relationship with the Great Britain average is also included. (SW)

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The Association for Institutional Research

RESOURCE ALLOCATION IN U.K, UNIVERSITIES

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RESOURCE ALLOCATION IN U.K. UNIVERSITIES*

Bryan J. R. Taylor
University of Bath

The investigation described was carried out by a Working Party of the Conference of University Administrators (CUA), and we are grateful for this opportunity to give a progress report. I hasten to add that any errors of interpretation or fact are mine alone.

The CUA was inaugurated in 1973 with the primary objective of arranging an annual conference so that university administrators could meet to exchange ideas and information. This objective now extends to a year-round programme of training sessions and discussions of tertiary education. Local branches have been formed, and there is increasing liaison with overseas organisations.

The CUA initiates investigations and, for example, received laurels for its reports on forecasting [1],[2] which were the products of an *ad hoc* working party similar to that whose work is described in this report.

Working Party on Resource Allocation

The present working party, under the chairmanship of Michael Shattock, was selected with difficulty from among many volunteers and had its first meeting in November 1979. Thirteen universities are represented.

The working party has a very broad brief to explore all aspects of resource allocation and to report. It may decide on a "preferred practice," although I think this is unlikely. An immediate impediment arises in that an absolute revelation by the participants, warts and all, in the interests of full investigation, imposes a burden of confidentiality on the working party. How are we to preserve this confidentiality while describing an identifiable wart? This is a problem which will have to be resolved.

The Environment of the Investigation

Jean Jadot,[3] in reporting a wide-ranging international survey, suggested that U.K. universities are almost alone in enjoying 100% autonomy in respect of a wide variety of criteria. I suppose the only real potential restraint is the size of the funding allocation, which is now being used by the University Grants Committee (UGC) as a manipulative tool.[4] The power of this tool in restricting the autonomy of an institution will be appreciated with devastating clarity by one university which has been instructed to reduce its student load by 30% and to make do with a recurrent budget reduced by 44%--and this over three years. I am glad to report that the University of Bath is one of the handful of institutions escaping a major cut in funding.

Although methods of resource allocation fall into a number of identifiable patterns, there is still great diversity. Herein lies the interest in the investigation—but also a potential threat to a readable and cohesive report at its conclusion.

The other present perturbations are inflation, cash limited funding, and the absence of a planning horizon. Well-established methods of resource allocation have been described in great detail by respondents, who then add the rider that they have been abandoned because of financial stringency. The replacement of a resigning technician, hitherto a peripheral matter defined automatically, can now wrinkle a vice-chancellor's brow. The responses of the universities to this state of flux were described by Shattock.[5]

The growth period of the 1960's and early 1970's has reached its zenith, and the current economic uncertainty is compounded by a realisation that universities will soon face the consequences of a dramatic decline in the birthrate eighteen years previously.

Research explorations are best directed at describing a stable phenomenon, but we now find ourselves aiming at a highly volatile target and we must be careful not to be too beguiled by the changes rather than the primary objective.

The Organisation of the Investigation

We are dealing with a broad field, and it was prudent to divide into the following sub-groups to examine particular aspects:

a. Structures and constitutions
b. The use of norms and formulae
c. Administration and central services

* This is an updated version of an article (same title) which appeared in the *Journal of Tertiary Educational Administration* (V. Massaro, Ed.) 3.1 (1981) 23-24. The paper was also presented at the annual conference of the European Association for Institutional Research, November 7, 1980. Printed with permission.

d. Minor works, maintenance, and space
e. Equipment.

Each of the sub-groups questioned in depth every institution represented on the working party. There was a period when we were all examining our institutional navels with an almost unbearable intensity. For the last two years we have been gathering information, and the next twelve months will be spent in its arrangement and coordination. We have the data about ourselves and now have to decide what to do with it.

We have visited some institutions outside the working party representation, and much thought went into determining how the visits should be conducted.

Sub-Groups on Norms and Formulae

It would not be appropriate for me to comment on the results of other sub-groups, but I can comment on the use of norms and formulae because I have been trying to synthesise a summary of the responses received by the sub-group.

The information sought by the sub-group fell into the following categories:

a. Student load formulae and weightings for level of study
b. Academic staffing levels—staff/student ratios—cost bases
c. Technical support staff—formulae—ratios
d. Departmental clerical staff—formulae—ratios
e. Other staff
f. Procedures for handling vacancies
g. Departmental budgets—virement levels—is under/overspend carried over—how is the budget monitored—formulae?
h. What statistical data bases are used and by whom?
i. What elements of departmental budgets are considered as central overheads in returns to the UGC (e.g. telephones)?
j. How are student numbers and quotas determined and by whom?
k. What use is made of national comparisons and by whom?

The replies revealed a wide diversity of methods, and a systematic classification is proving difficult. You would not thank me for giving a catalogue of the differences, and it will suffice to give some examples:

• One university determines the departmental entitlement to clerical staff using this formula:

$$N = (¾) \times [(P/2) + (L/5)] + (S/200)$$

(Where: N = Points; P = No. of professors; L = No. of other academics; S = Student load)

This general formula is amended by various conditions about departments without professorial heads, personal chairs, etc., and it is stressed that the formula offers guidance only, with judgement being much more important.

• Another university has a points system based upon a general allocation of 2 points for each pure science department, plus 0.91 points per academic member of staff. The value of a point to the department in 1978 was £4,227. Yet another university has a complex regression formula which allows for economy of scale, subject category, etc. to indicate priorities for academic staff establishments. The analysis is still performed, but it is disregarded in favour of empirical judgements in the light of the current economic climate.

. . . and so it goes on. A bald and undigested list of facts would be tiresome, and I prefer now to turn to something which I hope is more interesting.

National Comparisons

It was mentioned earlier that university autonomy is bounded by cash availability. This is a matter of common sense. What is perhaps not so obvious is the influence which this boundary may have on the determination of priorities within institutions as matters of expediency.

Let us suppose that a particular institution is generously funded for its student load. There are a variety of paths along which we might be tempted to wander as a consequence of that supposition. Does the institution acknowledge that it is being generously funded? Does it even know of its good fortune? To be realistic, I don't think that it matters one way or another within the institution *until* the funding organisation makes a judgement. Then the issue assumes paramount importance.

For the sake of the argument, let us assume that the decision makers in the institution feel that they are treated generously, even if they would deny it to the death in public. Their reaction could go something like this: In times of economic uncertainty it could be imprudent of this institution to use its good fortune in the employment of higher than average numbers of tenured academic staff; therein would be a trap for the unwary if funds declined. Hence, such an institution would afford a higher priority to incidental expenditures such as cleaning, amenities, and anything which does not imply a long-term commitment.

A relatively underfunded institution has a different problem. It would do its utmost to afford tenured academic staff—they are at the "sharp end" and also tend to be powerful. Such an institution would sacrifice expenditure headings of lesser importance as a matter of expediency.

We now have the basis for an hypothesis to explore. It is suggested that, in British universities, expenditure on tenured academic staff will tend to "hug" the average much more closely than incidental expenditures.

There is a wealth of undigested information available. At the end of each financial year, every university returns a "Form 3" to the UGC giving a detailed account of its financial stewardship during the year. For each of 17 subject categories, expenditure under five headings is given. The student loads in six levels (undergraduate, postgraduate course, and postgraduate research—each full time and part time) are also known for the 17 subject categories.

Together, these represent 187 bits of information from each university. In addition, details of income under 26 possible sources are given, and non-departmental expenditures are given under 45 different headings.

In total, 258 bits of information go to the UGC from each university (and university college in the case of Wales). As there are 51 returning institutions, this sums to more than 13,000 items of information. The UGC assembles the figures into 48 pages of tables which are sent to each institution as the "Form 3 Outturn." Much later, the data are published.[6] The UGC maintains its "non-interventionist" stance by publishing only the raw data without any interpretation. A computer addict finds it a compulsive matter to get the data on file!

Averages and Weightings

The hypothesis is that expenditure on academic staff will hug the average more closely than incidental expenditures. It should be emphasised at this point that *the average has no intrinsic sanctity nor merit*. An institution which seeks to make its expenditure average for its own sake is in danger of becoming an average institution. This will be self-evident, but it is an everpresent danger because a numerical argument based upon elevation to the average is beguilingly easier to make than one dependent upon academic premises.

It is axiomatic that it is more costly to train a doctoral student than an undergraduate, and this is often reflected in cost calculations. It is assumed that calculations of average costs take this difference into account by weighting the research student such that he or she is worth, for example, three undergraduates. Because weighting seems to assume cardinal importance, we must explore it more closely.

The UGC publishes space norms,[7] recommending areas for each student by level of study and subject to cover all activities in a university—not only for departmental activity, but for such things as kitchens, students' union administration, the dental service, and so on. The presence of a student generates a demand for specific areas of departmental and non-departmental space.

For example, it is recommended that the undergraduate biologist requires an allowance of 5m² for laboratory and other specialised subject needs. The postgraduate research student of biology requires 15.2 m² of such space. Each generates a demand for 4.35 m² of space for academic staff use, 0.45 m² for departmental administration space, 0.55m² of central administration space, right down to 0.18 m² towards a pavilion and groundsman's store for garaging his tractors.[8]

The application of the space norms to the Form 3 Outturn statement of student loads by universities is a simple computing job, and if it is assumed that every university has its norm provision of space for its exact mixture of students (by discipline and level of study), area-related costs can be calculated per square metre and compared with the British average derived by division of total G.B. (Great Britain) expenditure by the sum of all of the space provided for the norm satisfaction of G.B. student loads.[9] The above process describes a tolerably close type of weighting for space-related expenditures. It is appreciated that institutions will have more or less than the exact norm provision for their mixtures of students.

Now let us explore the consequences of weighting departmental costs. (Again, London, Oxford, and Cambridge are excluded from the averages.) Take as an example the UGC subject category of "studies allied to medicine and health" for which the 1979-80 student load and total net departmental expenditure[10] are shown in Table I, both for the University of Bath and for Great Britain.

Table I

University of Bath and Great Britain (excluding London, Oxford, and Cambridge) Student Loads and Total Net Expenditure in 1979-80 in Studies Allied to Medicine and Health

	Student Load			Total Net Expenditure
	u/g	p/gC	p/gR	
BATH	223	3	54	£642,249
G.B.	2,981	189	454	£7,310,746

Footnote to Table I
u/g = undergraduate; p/gC = course postgraduate;
p/gR = research postgraduate

Without any form of weighting for level of study, the unit costs are simply calculated as follows:

for Bath — £642,249/(223 + 2 + 54) = £2,302

for G.B. — £7,310,746/(2,981 + 189 + 454) = £2,017

The calculation can be repeated with differing weight for postgraduates, and some specimen consequences are shown in Table 2.

Table 2

Percentage Relationships between the University of Bath and Great Britain Total Net Unit Costs with Different Weightings for Level of Study in 1979-80

Weightings			Departmental Total Net Unit Costs		Bath as % of G.B.
u/g	p/gC	p/gR	Bath(£s)	G.B.(£s)	
1	1	1	2,302	2,017	114%
1	2	3	1,651	1,549	107%
1	4	6	1,157	1,132	102%

Table 2 shows the consequences of applying different weightings for levels of study to Bath and G.B. data. The final column of percentages shows the relationships with differing regimes of weightings. For most subject categories, the proportions of postgraduates are fairly small, and it will not be surprising that the percentages show only small changes with quite substantial alterations to postgraduate weightings. Reading down Table 2 gives the superficial impression of a widespread difference in the sums attributable to unit costs dependent upon

weighting levels, but as only one weighting pattern is used for each subject category, it is the horizontal differences which are important.

At risk of labouring the point, it is worth emphasising that the changes in the percentages are relatively trivial because, provided the same weightings are applied to local and national student loads, the unit costs so derived move together. Medawar,[11] in his Reith Lectures, gave an example of intelligence as follows:

> A cultured lady declares that now at last she understands why so many of El Greco's figures seem to us to be unnaturally tall and thin. It is because El Greco had a certain defect of vision which made him *see* people with that particular distortion, and as he saw them, so he drew them. But a child then pipes up with the following objection: "Surely if his eyes made everything look tall and thin, wouldn't he see his own pictures in a different way from us too, and wouldn't they look just as strange to him as they do to us? If *all* he was doing was painting people in the funny way he saw them, then surely his paintings would *have* to look all right to us if they were going to look all right to him."

Weightings are a bit like El Greco's lenses! If they distort the unit costs locally, they will compensatorily distort the national unit costs when the comparison is made, *provided the proportions of postgraduates are not wildly different.*

Inspection of Table 2 shows quite small horizontal differences between Bath unit costs and the G.B. equivalent. These small sums are swamped by differences *between* subject categories.

As an arbitrary pattern of weightings, those described by Cook [12],[13] have been adopted (although one should refer to the caveats of Dainton[14], Barnard[15], Green and Chatfield[16]) in order to produce G.B. total net unit costs by subject category for 1979-80 shown in Table 3.

Table 3

The Range of Undergraduate Total Net Departmental Unit Costs (G.B. averages) for 1979-80

Subject Category	Weighted Total Net Departmental Unit Cost (£s per u/g equivalent)
Education	521
Pre-clinical medicine	2,198
Clinical medicine	4,122
Clinical dentistry	3,690
Studies allied to medicine & health	1,549
Engineering	1,707
Other technologies	1,520
Agriculture & forestry	1,438
Veterinary science	4,713
Biological science	1,719
Mathematics	1,096
Physical sciences	2,060
Management studies	856
Social sciences	912
Architecture & town planning	1,255
Other professional & vocational studies	1,243
Arts	1,049

The differences beween Bath and G.B. unit costs in Table 2, with no weightings at all, were £285, or £102 with Cook's weightings. These within-subject consequences pale into insignificance when compared with the between-subject unit cost differences in Table 3. Provided the student load in each subject category is adequately supported at the average by the UGC, weightings for levels of study can be considered to be no more than fine tuning.

For the remainder of this paper, within-subject weightings are those of Cook (see Notes 12, 13), although the conclusions of the paper would be little affected whether the UGC does, or does not, use such weightings.

Calculation of the Averages

As the first example, let us consider the academic and related salary costs of the University of Bath. In the case of studies allied to medicine and health, the actual expenditure in 1979-80 was £368,658. The G.B. equivalent expenditure (excluding Oxford, Cambridge and London) was £4,502, 251. The student loads were given in Table I. The undergraduate equivalent unit costs of academic and related staff were therefore: Bath: £948; G.B.: £954. Had Bath been spending at the G.B. rate, its salary bill would have been £371,106—in fact, £2,448 more.

This sort of calculation can be done for academic and related staff expenditure for each subject category. For the University as a whole, the comparative expenditure is the sum of all of these subject category calculations, and the result is shown in Table 4.

Table 4

The Relationship of Expenditure on Departmental Academic and Related Staff in Bath (1979-80) to What It Would Have Been If Expenditure Was at the G.B. Level on Average.

	Actual expen. (a)	Expen. at G.B. rate (b)	(a/b)%
Sum of Academic & Related Staff Expenditures (all subjects)	£4,340,714	£4,738,010	91.6%

From Table 4, it can be deduced that the University of Bath could have spent an additional £397,296 on academic and related departmental staff in 1979-80 before expenditure reached the British average level for the Bath mixture of students. Had a different weighting regime been used, there would have been a slightly different result, but in the context of overall university expenditure the difference would be trivial.

The computer can make short work of such comparisons, and it is programmed to make similar comparisons for all 51 institutions, enabling the construction of Figure 1.

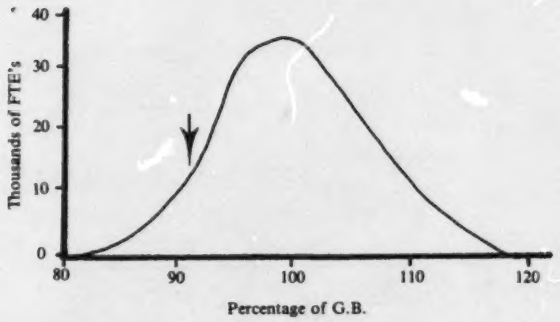


Figure 1. University student loads arranged to show the percentage relationships of departmental academic and related staffing costs to the G.B. average in 1979-80.

The G.B. average is 100% in Figure 1, and Bath was spending at a rate of 91.6% of that average in 1979-80.

Exactly the same sort of exercise is done for departmental support staff (technical and clerical) and for consumable and other departmental expenditure. Similar charts can be constructed.

All other categories of expenditure are treated in an analogous manner by the computer. Instead of weighting for subject categories and level of study, other more appropriate weightings are used: for example, for cleaning and custody costs, the weighting is by square metres appropriate to the detailed mixture of students in each institution, as described above; telephone costs, central administration, and like expenditure heads are weighted by enrolled student numbers; and so on. At the end of the calculations, the computer tabulates a summary output for each university with the format shown in Table 5.

Table 5

Computer Tabulation of Expenditure at the University of Bath in 1979-80 and Its Relationship with the G.B. Average

University: BATH
1979-80 Session

Total FTE loads 3788

Expenditure category	Actual expend.	GB average expend.	Difference	Actual as % Univ. total	GB av. as % of GB total	Cumulative GB %	Actual as % of GB	Expenditure category
Ed. Technology	208,976	164,267	44,709	1.91	1.33	1.33	127.22	Ed. Technology
Cap. from income	362,732	294,315	68,417	3.40	2.38	3.71	123.25	Cap. from income
Consumables	737,562	615,725	123,629	6.92	4.96	8.67	120.15	Consumables
Gen. Ed. Expend.	316,787	330,911	-14,124	2.97	2.68	11.34	95.73	Gen. Ed. Expend.
Library	557,452	594,080	-36,628	5.23	4.80	16.15	93.83	Library
Acad. Sals.	6,340,714	4,770,010	-397,296	60.78	38.51	54.65	91.61	Acad. Sals.
Administration	764,813	855,544	-90,731	7.18	6.92	61.57	89.39	Administration
Computer	251,631	291,651	-40,020	2.36	2.36	63.93	86.28	Computer
Amenities & Fac.	239,115	285,371	-46,256	2.24	2.31	66.24	83.79	Amenities & Fac.
Ord. Repairs	331,353	487,707	-156,354	5.01	5.94	71.68	77.56	Ord. Repairs
Support Sals.	1,908,584	1,443,928	-355,351	10.22	11.67	83.27	75.39	Support Sals.
Clean. & Cust.	379,515	535,795	-144,278	3.56	4.33	87.50	72.44	Clean. & Cust.
Power & Phones	466,803	656,670	-189,867	4.38	5.31	92.81	71.09	Power & Phones
Misc. Prems.	330,822	690,775	-306,743	3.14	5.18	97.99	52.13	Misc. Prems.
Miscellaneous	71,625	248,104	-176,479	0.67	2.01	100.00	28.87	Miscellaneous
Totals	10,653,494	12,368,854	-1,715,360	100.00	100.00	100.00	86.13	Totals

B. J. R. Taylor, Univ. of Bath, U.K. December 17th 1981
GB average excludes London, Cambridge, Oxford & the Business Schools.

N.B. Expenditure is net of self-balancing items - e.g. research & contract income. Source: UGC Form 1 returns.

Ed. Technology = educational technology; Cap. from income = expenditure on buildings funded from recurrent income; Consumables = departmental consumable expenditure; Gen. Ed. Expend. = educational expenditure not elsewhere in the table; Ord. Repairs = repairs to premises; Power & Phones includes water and heating costs; Misc. Prems. = premises expenditure not elsewhere in the table; Miscellaneous = the rest.

It will be seen from Table 5 that the totals suggest that our expenditure in 1979-80 could have increased by £1,715,360 before it reached the average for our specific mixture of students. Our total expenditure on this basis was 86.1% of the G.B. average level for our particular FTE load.

The computer arranges the output in rank order of the final column of percentages in Table 5. For instance, our educational technology expenditure was 127% of average and headed the table whereas, at the bottom of the table, miscellaneous expenditure was only 29% of the G.B. average.

Academic salaries at 91.6% of the average were clearly afforded preferential treatment considering the 86.1% overall average. Support salaries in departments were relatively disadvantaged at 75.4%. It is informative on university priorities for expenditure to see where, in the rank order, such items as academic salaries appear.

A mass of figures such as Table 5 lacks impact and easy interpretation. To clarify the argument on relativities, Figure 2 has been constructed. This relates to the G.B. expenditure for our mixture of students. The widths of the bands are proportional to the percentages shown in the Table 5 column headed "GB av. as % of GB total", which percentages are accumulated in the "Cumulative GB %" column.

Those familiar with the "Tress-Brown Index"[17] will detect some similarity with the "GB av. as % of GB total" column in Table 5. The Index gives an estimate of inflation as it affects university costs and also gives a percentage breakdown of costs. The Index gives a national average of, say, the percentage of recurrent income devoted to academic and academically related salaries and superannuation. Table 5 gives the equivalent percentage related *exactly* to the student load of the institution being tabulated. The range of percentage differences among institutions is more than 12%. This points to the danger of the adoption of Tress-Brown as a budgeting guide unless the student mixture is taken into account. Interested parties have been known to rank universities in order of the percentage of their income spent on library books. This, too, can be highly deceptive because, although *per capita* expenditure on books may be uniform throughout the system, other expenditures vary widely according to the subject mix of students and also their levels of study—hence, percentages of income spent on books could properly vary widely.

Figure 2 is a square representing 100% of G.B. expenditure for the Bath mixture of students. The area of the small scaling square has a monetary value of £123,689 at 1979-80 prices. Superimposed on the square, the vertical bands are extended or truncated in proportion to the actual expenditure in the various categories of expenditure as given in Table 5. The shaded portion is underspend which, net of the small overshoots on the left, is 14% of the total area of the square.

An incidental advantage of computerising the data

is the programmed print-out of about 150 tables, each of which lists universities in rank order of the size of their unit expenditure in respect of one budgetary head. For example, Table R3 in the print-out shows Bath's unit expenditure on periodicals in the library to be at 98% of the G.B. average, and we come 29th in rank order. In the table, the relative position and percentage relationship of all other universities is shown. The computer also does a regression analysis on the data in each expenditure head so that an allowance is made for size in order to estimate G.B. expenditure, and it prints out an indication of the statistical significance of the difference between actual and G.B. average expenditures.

As management information tools, even though they show the retrospective position, the tables enable a rapid response to almost any question on expenditure, and they offer powerful and impartial backcloths against which *special pleading* can be viewed.

As has been emphasised, the average G.B. expenditure has no special significance. The value of Figure 2 is that it presents a complex pattern of information in a readily assimilable form—it is not intrinsically a motive for change.

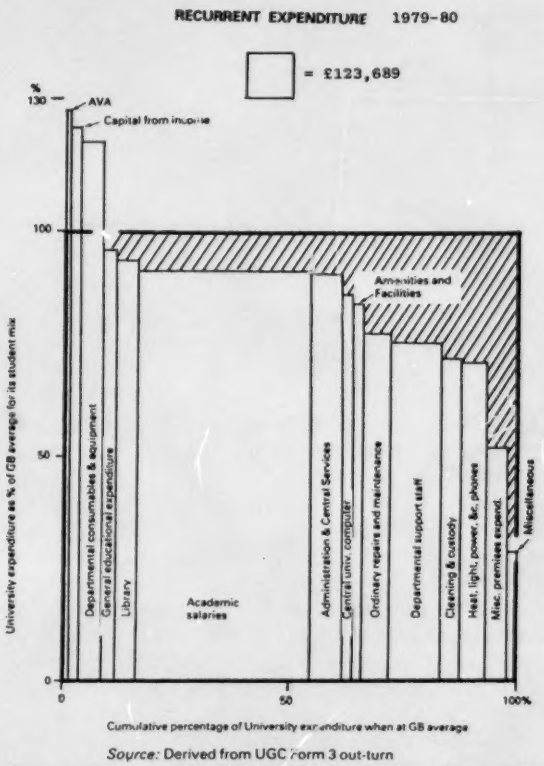
Other management information can be similarly displayed using the basic format and concept of Figure 2. For example, the total square can represent the G.B. average expenditure on the library for our mixture of students. The constituent bands then have their widths determined by average expenditures on books, periodicals, staffing, binding, other operating costs and so on. Again, the vertical bands are truncated or extended so as to give a visual indication of relative expenditures. Departmental academic and related staffing can be similarly treated. One incidental delectation offered to the mischievious is to call on the computer to produce the equivalent of Figure 2 for other institutions. It yields quite a lot of information on their relative priorities.

Figure 2 provides information, but little in the way of answers. Its main value is in the prompting of questions and identifying areas for enquiry. Each university must generate the questions and answers for itself, and it would be impertinent, not to say imprudent, for an outsider to formulate either questions or answers.

The Hypothesis

As the computer stores the contents of Table 5 (and therefore Figure 2) for all universities, it is easy to programme it to answer specific enquiries. It will be recalled that it was hypothesised earlier that expenditure on academic and related departmental staff will tend to hug the average more closely than other expenditure.

I must digress briefly to reveal my biological background. It is sometimes difficult to compare a parameter in, say, a mouse with that in an elephant. To overcome this, a "coefficient of variation" is used. This is defined as the standard deviation divid-



Source: Derived from UGC Form 3 out-turn

Figure 2. Chart to show the relationship between University of Bath expenditure and the G.B. average for its mixture of students.

ed by the mean, expressed as a percentage (the definition is often accompanied by the caveat that no one really knows what it represents). One further technicality is that because percentages are not additive, the means and standard deviations of populations of percentages are calculated via an arcsine transformation.

Table 6 gives a sample of means (and their associated coefficients of variation in italics) for various groupings of institutions and expenditure headings. Not all expenditure headings are shown, so the final column of "total university" is not the average of the preceding columns—for instance, all premises expenditures have been omitted for the sake of brevity.

Table 6 suggests some interesting relationships. For example, Scottish total university expenditure appears to be higher than average at the expense of England. Wales remains in the middle at 99.8% of the average, although distribution among Welsh colleges appears to have a high level of variation at 17%.

Comparisons of coefficients of variation tend to support the hypothesis—variations in academic staff expenditure among institutions, irrespective of groupings, tend to be smaller than variations in other expenditure headings. The intuitive argument is supported (but not confirmed) by the statistics. It is hoped that a further analysis will allow statistical

Table 6

The Mean Percentage Relationship (weighted for FTE loads) with the G.B. Average for Differing Groupings of Universities and Expenditure Headings. (Coefficients of variation are given in italics.)

GROUPING	Academic Salaries	Support Salaries	Construction & Equipment	Libraries	Administration	Amenities & Facilities	Total University
ENGLAND	99.8	99.2	100.0	99.8	100.0	100.0	99.2
(n = 31)	*14.5*	*24.7*	*47.2*	*23.7*	*22.3*	*29.1*	*14.5*
WALES	101.9	99.2	96.9	100.5	98.6	95.3	99.8
(n = 7)	*13.0*	*27.6*	*27.8*	*25.1*	*35.1*	*26.4*	*17.0*
SCOTLAND	100.4	102.1	95.2	100.0	99.0	99.9	103.5
(n = 8)	*17.1*	*21.9*	*30.1*	*29.2*	*21.3*	*31.5*	*11.1*
LARGE CIVICS	100.0	100.1	99.5	98.3	100.0	95.2	100.1
(n = 14)	*14.4*	*18.2*	*26.1*	*20.6*	*17.4*	*24.2*	*14.7*
SMALL CIVICS	100.0	101.0	100.0	113.6	95.7	99.7	99.7
(n = 10)	*15.0*	*22.8*	*23.8*	*13.9*	*34.5*	*27.5*	*14.9*
NEW	99.6	98.6	102.7	109.4	100.9	119.8	99.6
(n = 10)	*15.9*	*23.0*	*27.2*	*11.9*	*22.4*	*17.1*	*14.7*
TECHNOLOGY	100.0	98.3	93.4	90.5	99.5	100.5	97.8
(n = 12)	*17.5*	*29.8*	*31.3*	*27.0*	*26.2*	*31.0*	*15.8*
TOTALS	100.0	99.8	99.6	99.9	99.9	99.9	99.9
(n = 46)	*15.5*	*25.1*	*28.4*	*25.1*	*23.5*	*29.6*	*15.7*

probabilities to be added to the conclusions.

What about coefficients of variation elsewhere in Table 6? Perhaps their most surprising feature is size. Consider, for example, administrative expenditure. The large civics[8] average out at 100% of the G.B. level, whereas the equivalent figure for the small civics is 95.7%. Is this negative "economy of scale?" In spite of having a lower mean, the small civic universities have a large scatter indicated by the coefficient of variation at 34.5%. What is it that some of them are doing that others omit? Is the difference reflected in performance in some measurable way?

Table 6 is only one of the many possible arrangements of the data derived from the analyses. Others will doubtless occur to the reader; for example, is library expenditure correlated with the percentage of "arts" students in the institutions? Is the cost of repairs and maintenance closely correlated with the age of the university?

Conclusions

As was described earlier, the CUA Working Party now has the job of analysing the data collected by the sub-groups, and it would have been presumptive of me to anticipate that synthesis. I hope that I have been able to give a flavour of one of my contributions towards the search for patterns of resource allocations in U.K Universities. The interpretations of those patterns will be sought by the working party. The uncertainty implicit in that remark reflects the enormous differences in resource allocation methods.

This wide spectrum produces a high level of variation, as demonstrated by the sample coefficients in Table 6, and this is consistent with the high level of autonomy in the institutions. By 1983-84 the U.K university system will have to cope with a 15% reduction of resources in real terms, and it will be fascinating to explore a time series of the ways in which these reductions are achieved. In 1979-80 the cost of administration and central services varied from a high of £536 per student to a low of £140 per student in the extreme institutions. Does this variation show any consequence in the achievement of the aims of the institutions? How much will a retrospective analysis of the changes over the years reveal the methodology of institutions?

An endless number of questions on resource allocations spring to mind. Perhaps the biggest job of the working party is determining which questions are likely to produce worthwhile answers.

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Notes

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[7] *Planning Norms for University Buildings.* University Grants Committee, 1978.

[8] The norms vary according to student load for definition of some space categories.

[9] Great Britain (G.B.) averages in this paper exclude London, Oxford, and Cambridge Universities as being sufficiently different that their inclusion would distort the averages.

[10] Total Net Department Expenditure is the sum of expenditure on academic salaries, support staff salaries and wages, consumables, and other departmental expenditures.

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[18] The terms "civic," "new," and so on, are those used by Pickford, M., *University Expansion and Finance.* Sussex University Press: 1975, p. 237.

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